Periodic table

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One can present data about the physical properties of the elements in various ways. The **Periodic table of the chemical elements** is a display of the known chemical elements, arranged by electron structure so that many chemical properties vary regularly across the table.

The original table was drawn up with no knowledge of the inner structure of atoms: if one orders the elements by atomic mass, and then plots certain other properties against atomic mass, one sees an undulation or *periodicity* to these properties as a function of atomic mass. The first to recognize these regularities was the German [Johann Wolfgang Döberreiner]? who noticed a number of *triads* of similar elements. This was followed by the Englishman [John Alexander Reina Newlands]?, who noticed that the elements of similar type recurred at intervals of eight, which he likened to the octaves of music, though his *law of octaves* was ridiculed by his contemporaries. Finally the German Lothar Meyer and the Russian chemist Dmitry Ivanovich Mendeleev almost simultaneously developed the first periodic table, arranging the elements by mass (though Mendeleev plotted a few elements out of strict mass sequence in order to make a better match to the properties of their neighbours in the table - this was later vindicated by the discovery of the electronic structure of the elements in the late 19th and early 20th century. (see also atomic number)

Strictly speaking, we are referring here only to the chemical table as a "periodic table", but it is just one type of periodic table, more specifically, it is a ***periodic table of the elements***. Omission of the important qualifier "*of the elements*" contributes perhaps to confusion over what is meant by "*periodic table*." As a counterexample, a chart of temperature or daylight hours versus the day of the year for someplace in the earth's temperate regions would also show periodicity, and hence could be termed a periodic table)

The following figure shows the currently known periodic table. Each element is listed by its atomic number and [chemical symbol]?:

Periodic Table of the Elements

Group	1	2		3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	I	II												III	IV	V	VI	VII	VIII
Period																			
1	1 H																		2 He
2	3 Li	4 Be												5 B	6 C	7 N	8 O	9 F	10 Ne
3	11 Na	12 Mg												13 Al	14 Si	15 P	16 S	17 Cl	18 Ar
4	19 K	20 Ca		21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr
5	37 Rb	38 Sr		39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe
6	55 Cs	56 Ba	*		72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg	81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn
7	87 Fr	88 Ra	**		104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110 Uun	111 Uuu?	112 Uub?	113 Uut?	114 Uuq?	115 Uup?	116 Uuh?	117 Uus?	118 Uuo?

Lanthanides	*	57 La	58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm	70 Yb	71 Lu
Actinides	**	89 Ac	90 Th	91 Pa	92 U	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No	103 Lr

Chemical Series of the **Periodic Table**

Alkali metals	Alkaline earths	Lanthanide	Actinides	Transition metals
[Other metals]?	Metalloids?	Nonmetals?	Halogens	Noble gases

(Here are other methods for displaying the table: Alternate Table - Big Table - Huge Table - Wide Table)

And here is the **periodic table** for [magnetic resonance]?.

The number of electron shells an atom has determines what period it belongs to. Each shell is divided into different subshells, which as atomic number increases are filled in roughly this order:

```
1s
2s          2p
3s          3p
4s       3d 4p
5s       4d 5p
6s    4f 5d 6p
7s    5f 6d 7p
8s 5g 6f 7d 8p
...
```

Hence the structure of the **table**. Since the outermost electrons determine chemical properties, those tend to be similar within groups. Elements adjacent to one another within a **group** have similar physical properties, despite their significant differences in mass. Elements adjacent to one another within a period have similar mass but different properties.

For example, very near to nitrogen in the second period of the chart are carbon and oxygen. Despite their similarities in mass (they differ by only a few [atomic units]?), they have extremely difference properties, as can be seen by looking at their allotropes: diatomic oxygen is a gas that supports burning, diatomic nitrogen is a gas that does not support burning, and carbon is a solid which can be burnt (yes, diamonds can be burnt!).

In contrast, very near to chlorine in the the next-to-last **group** in the chart (the halogens) are fluorine and bromine. Despite their dramatic differences in mass within the **group**, their allotropes have very similar properties: They are all highly corrosive? (meaning they combine readily with metals to form [metal halide]? salts); chlorine and fluorine are gases, while bromine is a very low-boiling liquid; chlorine and bromine at least are highly colored.

See also:

- Discovery of the chemical elements
- Elements song

External Links

- Chemistry: Web Elements

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